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O. P. BRYSCH, Editor

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1. MANAGEMENT

Gas Industry Management

The Gas Utility's Place in Area Industrial Development. G. R. Walton, *Gas Age 122,* 36 (1958) Aug. 21 (5 pp.)

Gas business is no more and no less prosperous than the area it serves. No matter how well-managed and modern an operation is, if it serves an area that is deteriorating, the facility will suffer. Article stresses that industrial sales or engineering man who is willing to do a little extra-curricular activity will aid the gas facility which employs him.

A Method of Establishing Gas Prices. C. C. Turner. *LP-Gas 18,* 37 (1958) Sept. (4 pp.)

LPG men frequently encounter financial difficulties because price charged by them for gas is incorrect. Primary reason: omission of operating costs. Article discusses basic costs found in an LPG business and how they should be considered in formulating a practical gas price.

Build Your Profits—Sell Kitchens Complete. H. Crane. Part 1. *LP-Gas 18,* 27 (1958) Aug. (5 pp.); Part 2. *Ibid.,* 33 (1958) Sept. (4 pp.)

Complete all-gas kitchen means greater comfort and convenience for customers and greater profits for dealer, yet many dealers have failed to tap this market. Article tells, in part 1, how to get into kitchen business. Part 2 discusses how to sell, design and install built-in all-gas kitchens.

Competition

Gas Cooking Wins in Another Test. W. Eggers. *Gas Age 122,* 18 (1958) Aug. 21 (3 pp.)

For 90 days, 58 Pierce City, Mo., families traded their gas ranges for new electric models on a trial basis. All but nine of these families chose to have their gas ranges reinstalled, even though they were offered the electric ranges at half the retail price with five years to pay.

The Natural Gas Delusion. W. W. Bayfield. *Coal-Heat 74,* 18 (1958) Aug. (2 pp.)

Executive of American Coal Sales Association advocates federal legislation which will conserve natural gas for high priority uses to which it is best suited and which will prohibit sale of natural gas at dump prices.

Federal Power Commission

The "Memphis" Decision—Where Do We Go From Here? H. F. Lippitt, II. *Public Util. Fortnightly 62,* 289 (1958) Aug. 28 (15 pp.)

New series of complications has arisen for the gas industry as a result of the U.S. circuit court of appeals decision (District of Columbia) in the popularly-called "Memphis case," which prevents pipeline companies from increasing rates by filing with the FPC unless distributing customers agree to the increase. With a further appeal to the U.S. Supreme Court held over until at least next fall, and with the uncertainty of congressional action, the gas industry's worries about what to do as a result of the Memphis decision are many and vexing.

Petrochemicals

Southern Ontario—Favored Ground for Chemicals. *Can. Chem. Processing 42,* 20 (1958) Aug. (5 pp.)

Total sales figures of producing plants in Ontario for chemicals and allied products was $705 million. It is safe to assume that the bulk originated in the Toronto-Sarnia-Niagara-Windsor area. The figure represents an $82 increase over 1956 shipments, and much of the increase can be attributed to such new installations as Canadian Oil's aromatics unit and Imperial Oil's detergent alkylate plant in Sarnia, Goodrich's PVC plant in Port Robinson, Surpass Petrochemicals and Borden Chemicals plants in Toronto and to such additions to existing facilities as Dow's and Polymer's in Sarnia, Brunner Mond's in Amherstburgh and Linde's in Welland. C-I-L completed its Hamilton peroxide plant near the end of the year.

UREA—The Petrochemical to Watch. L. F. Hatch. *Petrol. Refiner 37,* 123 (1958) Aug. (4 pp.)

Ten growth and use patterns of petrochemical with dynamic future. Its expansion record for the past eight years is 270%. Four major use areas for urea are fertilizers, animal feeds, synthetic resins and miscellaneous industrial applications. While agriculture takes the bulk of urea production, other uses are many and increasing both in number and in quantity of urea consumed.

Australian Development

Industry Statistics Show Continued Progress. K. W. Thorne. *Nat. Gas Bull. 22,* 4 (1958) June (4 pp.)

At the end of 1957, progress recorded by the Australian gas industry showed the following: 1,298,000 customers; miles of main laid totalled 13,702, an increase of 27% in the past five years; gas issued rose to 239,319,000 therms compared with 234,151,000 for 1956, while coal carbonized dropped from 1,985,000 tons in 1956 to 1,975,000 tons in 1957; gas purchased from refineries increased from 33 million therms in 1956 to 39 million therms in 1957.

Canadian Development

Northeastern British Columbia — Giant of the Future. G. L. Gray. Part 1. *Oil Gas J. 56,* 128 (1958) Aug. 18 (8 pp.); Part 2. **Northeastern British Columbia Offers Lucrative Oil Hunting.** *Ibid.,* 74 (1958) Aug. 25 (6 pp.)

Wildcat success ratio of 45-49% has stimulated a brisk drilling and exploration program in the Peace River country. Area is underlain by a large thickness of sediments. Many of these have been proved as potential reservoir rocks; a number of others have been little tested by drilling and remain as oil and gas prospects worthy of further investigation. First published study of the regional geology of northeastern British Columbia.

Japanese LPG Industry

Japanese LPG Industry to Double Sales. M. Serif. *LP-Gas 18,* 42 (1958) Sept. (2 pp.)

President of large LPG retail operation in Japan predicts that sales—only 500,000 gal in 1953—should pass the 100,000,000 gal mark in 1958. This is double the 1957 figure.

Russian Exports

Russia Eyes Major Oil-Exporter Role. E. M. Brandes. *Oil Gas J. 56,* 62 (1958) Aug. 25 (3 pp.)

Recent talk indicates that the Soviet Union will step up oil exports in the future on a large scale as a political weapon in the cold war with the West. Comprehensive report on such possibilities written by an AEC economist.

Pipeline Construction

Natural Gas Construction Data. Calendar Year 1957. (New York: Gas Appliance Manu. Assoc. (1958, June.)

Data compiled by Marketing and Statistical Dept. of GAMA indicates that: gross assets of gas utility and pipeline industry total approximately $19 billion; it serves 39,465,000 customers, adding over 900,000 customers/year; natural gas and natural gas liquids now supply 27.9% of the nation's energy requirements. During 1957, to keep pace with industry growth, the Federal Power Commission authorized construction involving expenditures of $385,506,000. Total natural gas industry construction during that period involved expenditures of $1,772,000,000. Study is concerned with construction involving interstate transmission facilities.

Mathematical Methods

How BA Uses Operations Research. W. J. McGuire. *Can. Chem. Processing 42,* 28 (1958) Aug. (4 pp.)

British American Oil Co. Ltd. installed an operations research section almost five years ago to establish a method to organize and relate the great mass of data that represents the manufacturing division's operations. Essential aspect of the methodology of this department is the construction of a scientific model of the system under study. With the model the research manipulates the system and determines how it can be altered to maximize its effectiveness.

Education

Chemical Engineering in the U.S.S.R. J. G. Tolpin. *Chem. Eng. Progress 54,* 70 (1958) Aug. (7 pp.)

Detailed analysis of the chemical engineer in the Soviet Union, how he is trained, where he works and on what, the present state of chemical engineering in the U.S.S.R., and other facets of the Soviet counterparts of American engineers.

Personnel

Engineering in Europe . . . A Quick Look. E. J. Tangerman. *Product Eng. 29,* 32 (1958) Sept. 1 (6 pp.)

Digest of current opinion, gathered from talks with engineers in London, Hannover, Zurich, Baden, Milan, Turin and Stockholm, on topics of training, advancement, availability and use of engineers, design and research and development organization.

Cost Accounting

Cost Controls for the Drilling Contractor. W. H. Helmerich III. *Oil Gas J. 56,* 104 (1958) Sept. 8 (6 pp.)

Case history presents one answer to current competitive situation in drilling contracting business. Company found that use of this system of cost control accounting led to a better understanding between contractor and operator. System enables cost reduction at every point possible.

How Inflation Affects Cost Analysis. F. C. Jelen. *Petrol. Refiner 37,* 101 (7958) Aug. (6 pp.)

Effects of inflation and income tax in cost comparisons made using capitalized cost method. Method can be used to replace cost comparisons made on the basis of a dollar of constant quality.

Safety

Blowouts Take a Fearful Toll. H. D. Binney. *Oil Gas J. 56,* 210 (1958) Aug. 18 (3 pp.)

Blowouts continue to plague the Canadian oil industry. There have been 32 since March, 1948, for an average of 3.2/year. Rig loss alone exceeds $2,000,000. Article points out ways of preventing these costly accidents.

Explosion Hazards. A. R. Myhill. *Gas J. 295,* 385 (1958) Aug. 20 (3 pp.)

Discussion of explosion hazards common to gasworks and steps which can be initiated to minimize their occurence.

Safety and the Contractor. B. A. C. Whyte. *Gas J. 295,* 379 (1958) Aug. 20 (6 pp.)

Major problem for contractor is that of accident prevention during construction. Accident prevention must begin at management level, extend to the supervisory staff at a particular site and include the cooperation of every workman. Article discusses steps taken, both legislative and voluntary, to reduce accident frequency rate.

Safety in the Chemical Industry. *Chem. Ind., 988* (1958) Aug. 9 (7 pp.)

Radioactive substances may be regarded as toxic materials having the additional property of causing insidious ill-effects within the human body while remaining outside it. This property has required the development of unique systems of remote manipulation and shielding, while the risk of taking a radioactive substance into the body has made necessary the extension of common industrial methods of enclosure and ventilation to meet the exceptional toxicities encountered.

Safety—in the Gas Industry. T. B. Livingstone. *Gas J. 295,* 366 (1958) Aug. 20 (6 pp.)

Discussion of safety practices considers three broad divisions: 1) those covered by statute; 2) those covered by recommendation, and 3) those dictated by experience and common sense.

Welding Fabrication. Some Aspects of Application and Control. A. M. Horsefield and R. P. Newman. *Gas J. 295,* 392 (1958) Aug. 20 (4 pp.)

Article discusses safety of a given structure insofar as this might be effected by the application of welding. In a general sense, structural integrity is attained through the exercise of informed design knowledge, the correct choice of material, control of workmanship, and proper deployment of inspection.

Well-Trained Crews Vital to Safe Air/Gas Drilling. *Drilling 19,* Aug. (2 pp.)

Carelessness of rig personnel remains greatest danger in gas drilling. Crew must be carefully instructed in inspection procedure and correction of faulty mechanical equipment on rig.

LPG

LPG Sales: Jump Instead of Slump. *Oil Gas J. 56,* 114 (1958) Sept. 1

LPG sales in 1957 reached nearly 7 billion gal, a gain of 4.6%, compared with the previous year's gain of 8.4%. Yet, when compared with the 0.2% gain for all products in 1957, LPG's growth looks good. Biggest sales increase last year was in LPG sold to gas companies for use in gas manufacturing. This totaled 231,155,000 gal, an increase of 9%. Use of LPG as fuel at refineries fell 14%.

Pipeline Systems

Westcoast Transmission. Trans-Canada Pipelines. M. Duffy. *Gas World 148,* 331 (1958) Aug. 23 (2 pp.)

Brief resume of highlights which surrounded respective incorporations of the Westcoat Transmission Company and of Trans-Canada Pipelines. Chronological expansion of each company is discussed.

2. ENERGY SUPPLY AND ECONOMICS

Reserves

The Search for and Exploitation of Crude Oil and Natural Gas in the OEEC Area. (Paris: Organisation for European Economic Cooperation, 1957, Dec.)

Presentation of oil and gas position of the OEEC countries and Spain and Yugoslavia at the end of 1956. Besides the large map (scale 1:2,500,000), tabulated data are presented on 1) mining law and fiscal regulations; 2) oil geology; 3) discoveries, geographically and geologically grouped; 4) estimates of OEEC regions as to oil prospects, and 5) statistics on prospecting and exploitation. In view of the rising demand for primary energy in Europe and the dangers of dependence on the Middle East as evidenced by the Suez crisis, the report considers Western Europe to have distinctly encouraging oil prospects. Stimulating legislation and member cooperation are recommended to increase production, which is stated as 15.5 million tons crude oil equivalent, as against a demand of 130 million tons.

World Crude Reserves. *World Oil 147,* 134 (1958) Aug. 15 (2 pp.)

Free World crude oil reserves rose to 229,199,744,000 barrels (Jan. 1, 1958), an increase of 12.7 billion barrels, or 5.9% over the revised estimates of the total at the beginning of 1957. Normal development of major Middle East oil fields accounted for 8.2 billion barrels or nearly two-thirds of the Free World's increase. Area's total reserves rose to 164.3 billion barrels for 71.7% of the world total.

World Oil Demand. *World Oil 147,* 132 (1958) Aug. 15. (2 pp.)

World supplies of crude oil, natural gasoline and lease condensates increased to 18,678,300 barrels daily in 1957, creating an excess over demand of 471,300 barrels daily. By 1967, daily demand is expected to be 24.8 million barrels. Portion of this expected increase is credited to the continuing increase in the industrialization and economic activity in South America, Canada, Western Europe and heretofore underdeveloped nations in Asia and Africa.

Competition

Fuels: A Look Ahead. L. E. Stewart. *Power 102,* 75 (1958) Sept. (6 pp.)

Forecast: Coal will expand its share of total power generation from 50 to nearly 61% during the next seven years. Gas will invade oil regions of Florida, N. Pacific Coast. Availability and transmission costs will retard growth. Byproduct fuels, wastes offer new supplies of power for industrial use, new savings in plant operating costs.

Gas to Keep Gobbling Up Oil Markets. *Oil Gas J. 56,* 63 (1958) Sept. 8 (2 pp.); **Northwest Battle: Oil vs Gas.** *Nat. Petrol. News 50,* 129 (1958) Sept. (3 pp.)

Economists predict that future gains by natural gas will be more spectacular than petroleum products. Gas sales in 1946 exceeded 4 trillion CF; in 1957, they passed 10.6 trillion CF. In 1957, gas replaced 1.7 billion bbl of crude. Domestic petroleum demand rose from 1.8 billion bbl in 1946 to 3.2 billion bbl in 1957. While oil demand nearly doubled in 12 years, gas sales nearly trebled.

Shale Oil

Shale Oil Nears Competitive Level with Domestic Petroleum. *J. Petrol. Tech. 10,* 25 (1958) Aug. (3 pp.)

Advancements in oil shale technology, coupled with the sharply rising expense of finding and producing petroleum in the U. S., have closed the economic gap between the two fuels. Realistic comparison of shale oil and petroleum costs presents certain problems, for the real meaning of posted crude prices is difficult to ascertain. Marginal crude-producing areas, discovered before the steep rise in exploration and producing costs of the past 12 years, are now being exploited. Brief review of technical activities in oil shale and discussion and comparisons of shale oil production economics with crude petroleum prices.

Up-to-Date on Shale Oil. Known Reserves. D. C. Duncan. Processing Methods. F. L. Hartley. *Independent Petrol. Assoc. Monthly 29,* 22 (1958) Aug. (7 pp.)

Principal U. S. oil shale deposits are in the Green River formation of Colorado, Utah and Wyoming. Incomplete data suggest that parts of the deposits could yield an average of 25 gal of oil/ton and contain a total of more than 900 billion tons of oil shale with more than 500 billion barrels of oil. In research, objective of shale oil refining research program was to develop an optimum method for converting raw shale into "commercial shale oil"—a partially refined product that could be moved without difficulty through pipelines, blended with crude oils and sold as a high grade crude oil, superior in refining value to a majority of the country's crudes. Such a product would be further refined into solvents, high-test gasoline, jet fuels, diesel fuels and other quality oil products.

Petroleum Development

Argentina Gets Two More Offers. *Petrol. Week 7,* 45 (1958) Aug. 22.

Two more oil development offers have been received by the government of Argentina: one is a drilling contract, the other is a $70-million French-financed "package". Two bids follow the pattern set in the $1-billion worth of oil development and financing offers the Argentine government has received in the past month.

Petroleum Uses

The Pattern of Europe's Oil Consumption. *World Petrol. 29,* 72 (1958) Sept. (3 pp.)

In 1950 petroleum supplied 20% of Europe's energy, while in 1955 this had grown to 25%. Prospects are that, in 1960, oil and gas will climb to 40% of fuel requirements.

World Oil Demand Rises 6.1%. *World Petrol. 29,* 74 (1958) Sept. (2 pp.)

Growth rate of the world's oil consumption slowed again during 1958. The U. S. was especially low, estimated to rise only 1.3% in 1958. Free world outside the United States grew rapidly, with an increase of 9% estimated for this year.

Production Data

Application of Statistics to the Analysis of Production Decline Data. A. T. Chatas and W. W. Yankie, Jr. *J. Petrol. Tech. 10,* 52 (1958) Aug. (3 pp.)

Appraisal of an oil lease may often be effected through production decline analysis, which requires description of the functional relationship between the oil production rate and either cumulative production or time. Heretofore, attempts to define the function appropriate to a given set of production data have depended to some extent on subjective procedures. Objective solution is introduced, obtained by combining the principle of least squares with the theory of equations.

Petrochemicals

Petrochemicals on the Move. R. L. Bateman. *Oil Gas J. 56,* 126 (1958) Sept. 1 (3 pp.)

Petrochemical industry has not been immune to general business recession of 1957-58—but petrochemicals have fared better than most other industries. Both tonnage and value of output for 1958 will show increases over 1957 of 5-6%. Looking ahead

to 1960, petrochemical output should be 25% greater than this year's production.

Nuclear Energy

Atomic Power Moves Farther Away. *Business Week 1515,* 37 (1958) Sept. 13 (2 pp.)

Atomic experts from 69 nations convened at Geneva and concluded that an enormous amount of research remains to be done before nuclear power can ever have any general impact on the world's energy picture. Important highlight: Russia's announcement that it has in operation the first 100,000-kw unit of a planned 600,000-kw complex that will be twice the size of the largest U. S. project—Consolidated Edison's Indian Point (N. Y.) plant scheduled for 1960.

Nuclear Power Abroad in Mid-1958. H. M. Bratter. **Part 1. The Background of International Nuclear Plant Planning.** *Public Util. Fortnightly 62,* 228 (1958) Aug. 14 (8 pp.); **Part 2. The Goal of Future Achievement in Nuclear Development Abroad.** *Ibid.,* 316 (1958) Aug. 28 (8 pp.)

Progress of nuclear power development in India, Red China, Canada, Norway, Germany, Sweden, Belgium and Great Britain is discussed in Part 1. In Part 2 the author gives details concerning nuclear power developments in France, Italy, Brazil and Japan, as well as new programs for financing atomic power plants.

Review. Operation of Nuclear Power Stations on the Grid System. E. Anderson. *J. Inst. Fuel 31,* 362 (1958) Aug. (8 pp.)

In Great Britain, indications are that the gas-cooled reactor will be further developed. Recent work at the Calder plant showed that improvements could be attained by increasing the size, working at higher temperature, "flattening", recycling and using a more advantageous coolant.

3. NATURAL GAS AND PETROLEUM PRODUCTION

Drilling

Active Search Continues to Improve Drilling Techniques. *World Petrol. 29,* 54 (1958) Aug. (4 pp.)

Percussion, sonic and turbodrill investigations continue. Turbine-powered wheel drill is proposed; air drilling applications are broadened by new grouting fluids and foaming agents.

Drilling and Completion Cost Cut 36% on West Texas Well. *World Petrol. 29,* 62 (1958) Aug. (2 pp.)

Upton County (Tex.) slim-hole well is permanently completed without casing to save $30,000 from conventional 7000-ft wells in the area.

Five Years of Work Precede BP Drilling in Persian Gulf. *World Petrol. 29,* 43 (1958) Aug. (3 pp.)

As the culmination of nearly five years' work by many specialists, the first offshore well to be spudded in by Abu Dhabi Marine Areas Ltd., in its Persian Gulf concession off the coast of the small sheikdom of Abu Dhabi, began drilling early in 1958. ADMA is owned two-thirds by the British Petroleum Co., whose exploration subsidiary, BP Exploration Co. is the operator, and one-third by Cie Francaise des Petroles.

A Nonfermentable Starch for Drilling Fluids. W. L. Owen and W. A. Romans. *World Petrol. 29,* 49 (1958) Aug. (4 pp.)

Starch for drilling fluids previously reacted with ortho-benzyl parachlorphenol has been found to be resistant to rapid deterioration by micro-organisms in fresh water fluids, thus increasing the areas in which the starch may be used to reduce water loss.

PPL to Drill Another Test Well at Karachi. *Progress 3,* 1 (1958) Aug. (2 pp.)

Preparations will be made this year for drilling a second well on Karachi structure with a heavier outfit. It was pointed out that the consumption of 10,874 MCF of Sui Gas in 1957 saved the country from importing some 250,000 tons of fuel oil, thus averting an expenditure of more than two crores of rupees in foreign exchange. Chairman's statement also described development of Sylhet Gas field.

Instrumentation for the Driller. J. W. Knowlton. *World Petrol. 29,* 66 (1958) Aug. (2 pp.)

Complete instrument panel is an integral part of the rig and should include weight indicator, torque gauge, electric tachometer, accurate pump pressure gauge, pump stroke-and-volume indicator, tong torque gauge and recorders.

Turbodrill Gamble Is Paying Off. *Oil Gas J. 56,* 215 (1958) Aug. 18 (2 pp.)

One contractor's experience: turbodrilled wells have cut from 16 to only 3 the number of total days required to drill and set two strings of casing. Rotating hours have been cut from 111 to 35. Drill-pipe twistoffs have disappeared; no turbodrill hole has been more than ¾° off vertical.

Air Drilling

The Cutting Carrying Capacity of Air at Pressures Above Atmospheric. K. E. Gray. *J. Petrol. Tech. 10,* 180 (1958) Aug. (6 pp.)

Slip velocities, calculated from experimentally determined drag coefficients, had deviations ranging from 0-15% with an average of 6.49% for sandstone and 0-11.8% with an average of 7.10% for limestone. The commonly used 3000 ft/min linear

velocity of free air is sufficient to remove only the very small rock particles from the borehole.

Exploration

Newest Major Oil Province at Swan Hills, Alberta. *Oil Gas J. 56,* 169 (1958) Aug. 18 (5 pp.)

Since early 1957, when the first discoveries were made, three oil fields have begun development and more successful exploratory wells have been drilled. Two of the fields indicate probable major oil reserves.

Refraction Surveys Work Well in Alberta Foothills. J. L. Robinson. *Oil Gas J. 56,* 143 (1958) Aug. 18 (2 pp.)

Refraction seismography surveys are being used successfully in shooting for structure in the foothills belt, where several major gas strikes have been made in the Mississippian Rundle. Several aspects of Mississippian recommend the refraction method for its structural delineation: 1) its refracts; 2) its high and fairly constant refracting velocity provides a norm for correlation over wide areas; 3) structures are large.

Wildcatter's Delight . . . An Undrilled Basin. C. W. Hunt. *Oil Gas J. 56,* 136 (1958) Aug. 18 (5 pp.)

First published geologic report on oil possibilities of the Queen Charlotte Islands, now Canada's newest wildcat theater. Six-well exploration campaign has been started by the discovery of the first big oil in Alaska.

World Exploration Boom. *World Petrol. 29,* 67 (1958) Sept. (12 pp.)

During the post-World War II period, world exploration has increased by nearly 300%. Until recently production in the oil world was centered in the United States, Venezuela and the Middle East. North Africa now promises to become world's fourth major producing area. Detailed review of drilling and exploration now underway in major and other production areas.

Fracturing

Successful Propping of Fractures in Incompetent Formations. J. L. Huitt and B. B. McGlothlin. *Oil Gas J. 56,* 92 (1958) Sept. 8 (4 pp.)

High overburden pressure will cause an induced fracture to collapse due to crushing of the propping sand grains or to complete embedment of the sand grains in the formation. Article presents method of evaluating a formation to determine if embedment might occur and a way to prevent it.

Geology

Occurrence of Geological Systems in Western Canada. *Petrol. Week 7,* 20 (1958) Aug. 15 (2 pp.)

Oil and gas production are found in the following geological systems in Western Canada: Cretaceous, Jurassic, Triassic, Permo-Pennsylvanian, Mississippian and Devonian.

Sedimentary Geochemistry. A Possible Future Method for Correlation of Strata. G. D. Nicholls. *Petrol. 21,* 316 (1958) Sept. (6 pp.)

Article outlines results of researches carried out in the geology department, University of Manchester, by various geochemists during the past five years. It is suggested that the prospects of evolving a geochemical method of stratal correlation are encouraging and justify further investigations into the geochemistry of sedimentary rocks.

Offshore Operations

Maritimes Offer New Challenge. W. S. Shaw. *Oil Gas J. 56,* 252 (1958) Aug. 18 (5 pp.)

After 50 years of neglect, wildcatters are taking a new look at eastern Canada's Maritime provinces. Interest is focused on sedimentary rocks of Mississippian age which underlie large parts of northern Nova Scotia, eastern New Brunswick and most of Prince Edward Island. There is abundant evidence of hydrocarbons in the form of a small oil and gas field, oil seeps, shows in wells, oil shales and bituminous limestones. These provide assurance that hydrocarbons were generated in and have migrated through these rocks. Major problem: find reservoir rocks in a trap position.

More Orderly Procedures Mark Offshore Drilling. J. W. Calvert. *World Petrol. 29,* 36 (1958) Aug. (7 pp.)

Without any revolutionary development in equipment, drilling costs have been cut up to 35% by increasing weight on bits, increasing drill-collar diameters, adding stabilizers, decreasing mud weights. Drilling time has been cut nearly in half.

Offshore Seismic Exploration in the Caribbean Area. H. L. Grant. *World Petrol. 29,* 56 (1958) Aug. (2 pp.)

Approximately 75,000 sq miles of continental shelf offshore from Caribbean sedimentary basins offer a promising region for exploration.

Permeability

Effect of Laboratory Core Cleaning on Water-Oil Relative Permeabilty. H. Y. Jennings, Jr. *Producers Monthly 22,* 26 (1958) Aug. (7 pp.)

Review of results of the relative permeability measurements indicate that a comparison of k_w/k_o data obtained from field core samples both before and after toluene extraction showed a measurable change in the data, but in most cases the changes are small and apparently not due to significant changes in wettability. Toluene extraction procedure used had a marked effect on the porosity and permeability of most of the core material tested.

Petroleum Development

Canada's Refining Capacity Soars. J. P. O'Donnell. *Oil Gas J. 56,* 197 (1958) Aug. 18 (4 pp.)

With half a dozen new refineries building or planned and existing ones being enlarged, Canada's capacity to process crude oil will be increased by nearly one-third in the next few years. Demand for refined products will increase as imports are displaced.

Eastern Canada Bids for Share of Spotlight. *Oil Gas J. 56,* 206 (1958) Aug. 18 (3 pp.)

Interest in the area is at an all-time high, with 78 companies having land holdings. Production of oil in Ontario increased 5% in 1957 over the previous year, and gas production was up 11%. Exploration drilling in Quebec was up 54%.

Petroleum Production

Gas Injectivity Profile Logging Is Successful. R. H. Widmyer. *World Oil 147,* 117 (1958) Sept. (4 pp.)

Gas injectivity profile logging as a means of locating points of gas entry into gas input well formations is providing good results for the Texas Co. Description of methods used and resulting factual data.

How Predicted and Actual Performance Compared in a West Texas Reservoir. E. E. Runyan. *World Oil 147,* 97 (1958) Sept. (4 pp.)

Predicted oil recovery was 35.6% of the initial oil-in-place or approximately 1,710,000 barrels to a depletion pressure of 200 psi. Actual oil production to Jan. 1, 1957 (10 years later) was 1,573,090 barrels or 32.77%. Ultimate recovery is expected to be 1,750,000 barrels, which is 36.4% of the initial oil-in-place. Actual gas-oil ratio is lower than predicted and actual reservoir pressure is slightly higher than predicted.

Navy Forcing Subsidence Showdown. *Oil Gas J. 56,* 52 (1958) Aug. 25 (2 pp.)

Los Angeles Federal court requested to order Wilmington field operators to come up with plan to halt sinking or shut in field's production. Navy also may seek $200 million in damages to its facilities.

Proper Pumping Speeds for Deep Wells. T. H. Fraser. *World Oil 147,* 89 (1958) Sept. (3 pp.)

Easy-to-use method is applicable to deep pumping wells with three- and four-way tapered rod strings. It can reduce operational troubles and increase profits. Procedures and example problem are included.

Shallow Production Spurs Delaware Basin Activity. *World Oil 147,* 94 (1958) Sept. (3 pp.)

In Culberson County alone, 16 wildcats are drilling after making only 13 completions during the first eight months of 1958. Reasons: good production from shallow fields; increased farmout activity; growing interest in deeper possibilities; improved output by means of fracturing; relatively few drilling problems.

Reservoir Engineering

Four-Section Spacing Marks a Progressive Step by Conservation Board. N. S. Morrisey. *Oil Gas J. 56,* 141 (1958) Aug. 18 (2 pp.)

Alberta's Oil and Gas Conservation Board has set a precedent by ordering 2560-acre spacing in the new East Calgary gas field. Four-section spacing allows for a systematic exploitation and eventual delineation of the reservoir.

Maximum Recovery. How Far Have We Come? V. E. Stepp and E. R. Brownscombe. *Oil Gas J. 56,* 171 (1958) Sept. 1 (5 pp.)

Only a start has been made in understanding the oil and gas reservoir. More knowledge is needed on rock wettability, surface forces related to wettability, reservoir inhomogeneities, an inexpensive agent miscible with both oil and water, and use of carbon dioxide.

Streaming Potential and the SP Log. M. Gondouin. *J. Petrol. Tech. 10,* 170 (1958) Aug. (10 pp.)

Laboratory apparatus was devised for measuring streaming potentials under pressure conditions normally encountered in wells. Reported data on streaming potentials across mud cakes were verified. Appreciable streaming potentials were found across shale samples. As in the case of mud cakes, the shale potentials varied with the concentration and nature of the impregnating electrolyte. Dependence on pressure was in a different relation than that of mud cakes, possibly because of the lower compressibility of shales.

Secondary Recovery

A Comparison of the Susceptibility of Various Strains of Sulfate Reducing Bacteria to the Action

of Bactericides. O. B. Williams. *Producers Monthly 22,* 12 (1958) Aug. (3 pp.)

Specific microbiological problem is to control the growth of bacteria of the genus Desulfovibrio, which leads to the formation of sulfide through sulfate reduction. If a water treatment to prevent sulfate reduction could be effected, a longer and more efficient life for injection wells could be achieved. Review of progress toward development of a standard method of testing bactericides for effectiveness.

The Development of New Bactericides and Flood Water Treatment Based Upon the Physiology of the Sulfate Reducing Bacteria. K. E. Anderson, R. Lanigan, F. Liegey, J. Worden, F. Yackovich and A. Finan. *Producers Monthly 22,* 16 (1958) Aug. (8 pp.)

Report of studies on Desulfovibrio desulfuricans conducted to obtain an understanding of the basic physiology of this organism in order to provide information that might be used to develop new methods of flood water treatment and find new types of bactericides.

Fire Flood Works, But Costs Are High. *Oil Gas J. 56,* 106 (1958) Sept. 1 (2 pp.)

Three-year thermal recovery experiment in California has proved that a fire flood can recover large quantities of oil which would otherwise remain in the ground. But over-all cost of $1 million for the experiment exceeded by several times the value of the crude produced. Within 18 months after ignition, fire flood produced about 50% of the oil in place around the four producing wells. Under ordinary conditions it would have taken 40-60 years to produce only 10-15%.

Fluid Injection for Oil Recovery. G. Roberts, Jr. and T. M. Geffen. *Oil Gas J. 56,* 86 (1958) Aug. 25 (5 pp.)

As oil finding costs continue to climb, closer attention is being given to increasing oil reserves through better recoveries from known reservoirs. Fluid injection methods can do this. There are many types of reservoirs and no one fluid injection method is best for all of them. Article indicates general characteristics where each fluid injection method is applicable and what its limitations are. Those most likely for a specific field can be chosen for studies.

Oil Recovery by Heat from In Situ Combustion. J. N. Breston. *J. Petrol. Tech. 10,* 13 (1958) Aug. (4 pp.)

Comprehensive and up-to-date review of the mechanics, operating variables and probable economics of the in situ combustion method of oil recovery. It distinguishes between the continuous burning and "heat wave" processes, and points out some of the advantages and disadvantages of each.

Reliable Interpretation of Waterflood Production Data. J. K. Jordan. *J. Petrol. Tech. 10,* 18 (1958) Aug. (7 pp.)

Water injection and oil and water production data, the time and location of water appearance and the production behavior of individual wells can be utilized to obtain a positive measure of the sweep efficiency and oil recovery at any stage of depletion. Various methods of interpreting waterflood data have been examined to determine the degree to which these methods significantly describe waterflood performance.

Well Productivity

New Giant Gas Field Is in the Making. *Oil Gas J. 56,* 106 (1958) Aug. 18 (3 pp.)

Magnolia Petroleum Co. recently tested the 2 Brown-Bassett with total depth at 14,700 ft in the Ellenburger. Seven tests at various depths and with various size chokes were conducted. Average flow was estimated at about 30,000,000 CF daily natural. Predictions are that well will do better when it cleans up.

Well Tools

New Casing-Testing Tool. L. C. M. Darling. *Oil Gas J. 56,* 161 (1958) Aug. 18 (2 pp.)

New casing-failure-elimination (CFE) tool is credit with effecting savings of $250,000/year. During first year of operation (1956) in Canada, 23% of all production casing strings run used the CFE tool.

4. GAS CONDITIONING AND LPG RECOVERY

Carbon Dioxide

CO_2 Removal and Recovery. T. W. Sharp. *Chem. Process Eng. 39,* 269 (1958) Aug. (6 pp.)

Many of the gases which enter into modern industrial processes contain, at some stage in their production, carbon dioxide as an unwanted constituent. In the manufacture of synthesis gases, whether derived from solid, liquid or gaseous raw materials, the problem of removing CO_2 inevitably arises. Numerous solutions to the problem have been offered, and article reviews some of the better known processes and establishes in a general way the particular conditions that determine which solution or combination of solutions shall be adopted.

Dust

Notes on the Removal of Particulate Matter and Vapour Phase Sulphur Compounds from Gases. R. J. S. Thompson and W. T. Crosby. *Gas World 148,* 23 (1958) Aug. 2 (6 pp.)

Review of problems associated with the removal of particulate matter from gases, and fuel gases in particular, and also the removal of those impurities present in the vapor phase. Processes and techniques discussed are well established from technical standpoint.

Hydrogen Sulfide Removal

Costs Favor Hot Carbonate Process. A. G. Eickmeyer. *Chem. Eng. 65,* 113 (1958) Aug. 25 (4 pp.)

Relatively new, hot potassium carbonate solution can prove less costly than amine treatment in removing large amounts of acid constituents from gas streams. Seven plants in U. S. currently use it. Accumulation of most recent information on the process, its comparative economics and some of its corrosion history.

Sulphur Extraction Project Gets Under Way. *Can. Gas J. 51,* 26 (1958) Aug.

Delivery of approximately 10 miles of gathering system pipe was made in early June as the first step for the $8 million sulfur extraction project being undertaken jointly 12 miles southeast of Calgary by Devon-Palmer Oils Ltd. and Texas Gulf Sulphur Company, Inc.

Three Ways to Purify Gas. F. Zapffe. *Oil Gas J. 56,* 100 (1958) Sept. 8 (4 pp.)

Amine, iron-sponge and hot potassium carbonate are the three most popular natural-gas-purification processes. Discussion of outstanding features of each, comparative economics, and criteria which dictate the process which should be applied in a given situation.

Natural Gasoline

El Paso Builds 'Inside-Outside' Plant. *Petrol. Week 7,* 32 (1958) Aug. 29 (2 pp.)

El Paso Natural Gas Products is building an enclosed natural gasoline plant in Wyoming, a move designed to protect it from extremely low winter temperatures and driving snowstorms.

Hydrogen Sulfide Removal

Cyclic Process for the Removal of Hydrogen Sulfide from High Temperature Gaseous Streams without Reduction in Temperature. L. N. Leum and P. M. Pitts (assigned to Atlantic Refining Co.) U. S. 2,845,382 (1958) July 29.

Hydrogen sulfide may be removed from high temperature (600°-1000°F) gas streams by contact with a solid alkaline earth metal hydroxide. The spent alkaline sulfide can be regenerated by contacting with a solution of the hydroxide in the presence of gaseous oxygen.

5. NATURAL GAS TRANSMISSION

Communications

Emergency Power for Microwave Stations. W. E. Freese. *Oil Gas J. 56,* 225 (1958) Aug. 18 (3 pp.)

Discussion of the advantages and disadvantages of various types of standby equipment, in particular the engine-generator system. Value of standby equipment is emphasized by the inclusion of a table which denotes average power interruptions/month over a 25-month period experienced by one company's microwave stations.

Microwave System for Four Corners. *Oil Gas J. 56,* 166 (1958) Sept. 1 (5 pp.)

Four Corners Pipe Line Co. uses a microwave "backbone" system located along the mountain tops with laterals to connect the intermediate pump stations. Average "backbone" path is 70 miles long with several paths in excess of 100 miles. Five lateral paths vary from 8-42 miles in length. Total system mileage is 795 miles.

Compressors

Jet Age Compressors. *Gas Age 122,* 36 (1958) Sept. 4 (3 pp.)

Gas-turbine-powered compressors are features of newer compressor stations at Texas Eastern Transmission Corp. Equipment offers potential of more power for less fuel consumption and a minimum manpower for control operation.

Pipeline Construction

El Paso Natural Gas Company's $135 Million Program for New Facilities. *Pipe Line News 30,* 41 (1958) Aug. (2 pp.)

Federal Power Commission has given complete approval to El Paso Natural's application to expand its pipeline capacity by 185 MCF/day to supply additional gas to existing customers in Arizona and California. Field facilities to increase the company's daily deliveries by 100 MCF also were approved. Still pending: portion of application affecting mainline facilities.

Niagara Mohawk Bolsters Gas Supply via New 24-in. Line. *Gas Age 122,* 33 (1958) Aug. 21 (3 pp.)

Installation work has been started on a $3½ million, 40-mile natural gas pipeline. Niagara Mohawk Power Corp. states line will establish a second major delivery point into Syracuse area and will serve as a reinforcement for the gas supply to North Syracuse, Chittenango, Watertown, Oswega, Fulton and Phoenix areas and will allow for future gas load growth in these territories.

Recent Developments in Canada. J. Grindrod. *Gas J. 295,* 267 (1958) Aug. 6 (3 pp.)

Canada's development program for natural gas industry recently was marked by three important milestones: completion of the Westcoast Transmission pipeline from the Peace River area into British Columbia, the completion of the second stage of the Trans-Canada pipeline from Winnipeg to the lakehead ports and the completion of the pipeline further east from Toronto to Montreal.

Relocation of Pipelines in Highway Improvement. L. H. Barfoot. Part 1. *Pipe Line News 30,* 38 (1958) July (5 pp.); Part 2. *Ibid., 28* (1958) Aug. (5 pp.)

Problems and solutions encountered in relocating pipelines. Special treatment is given to the subject of reimbursement for utility work. Conditions for payment are discussed.

Texas-Florida Gas Line. *Oil Gas J. 56,* 46 (1958) Aug. 25 (2 pp.)

Public offering of more than $54 million of stocks and debentures signals initiation of construction work on the Texas-Florida pipeline. Houston Corp. has won approval and financing of the 1516-mile transmission line that will move Texas and Louisiana natural gas to Florida.

Trans-Canada Pipeline Nears Completion. K. Kinney. *Oil Gas J. 56,* 204 (1958) Aug. 18 (2 pp.)

Welding has begun on the final 853 miles of 30-in. pipeline in Ontario. This will complete the 2300-mile system. Sometime in November, Alberta gas will reach burner tips in Montreal. Trans-Canada expects to be transporting up to 800,000 MCF daily at the end of the third year of operation, a volume anticipated at the end of the fifth year.

Pipeline Operations

Automation Pays Off at Pipeline Terminal. D. Sandford. *Oil Gas J. 56,* 113 (1958) Sept. 8 (5 pp.)

Union Oil Co.'s new Oleum terminal on its San Joaquin Valley crude line is monitored by the terminal operator but is actually automatic in operation. Twin receiving manifolds, capacitance analyzers and pressure controllers are the factors which contribute most strongly to automation of the terminal.

Coal Line Kinks Get Ironed Out. *Petrol. Week 7,* 38 (1958) Aug. 22 (2 pp.)

Article describes experiences of companies that have just completed the task of getting first cross-country coal line up to design capacity. Pipeliner studying lines to move oil shale will find discussion helpful.

A New Way to Measure Production in Slack Lines. *Oil Gas J. 56,* 88 (1958) Sept. 8 (4 pp.)

Air space in slack lines can be measured by injecting a known quantity of compressed air and observing the increase in line pressure. Tests of the equipment indicated a maximum error of 9%, but several improvements of the installation have reduced this error somewhat.

Valves

Automatic Shut-Off Valves for Gas and Oil Transmission Lines. C. S. Beard. *Instruments and Automation 31,* 1373 (1958) Sept. (4 pp.)

Although application of automatic shut-off valves is specialized, the manner of obtaining emergency operation is basic and uses a combination of bodies, actuators and pilots. Problems confronting the gas industry are unique because the industry operates under laws and franchises which require a continuance of service and which stipulate safe conditions. Some of the complications are considered.

Pipeline Construction

Mechanical Pipe Line Clamp. J. J. Tipton. U. S. 2,846,968 (1958) Aug. 12.

Pipe aligning clamp is claimed for holding ends of two lengths of pipe in close proximity during welding. Clamp is comprised of a pair of semi-circular rigid members pivoted together at one end, each member comprising a pair of spaced elements carrying several radial corrugated clamping lugs with a hook and linked lever at the free ends of the members.

Pipeline Operations

Apparatus for Cleaning Pipe Lines. Z. O. St. Palley. U. S. 2,845,935 (1958) Aug. 5.

Apparatus for washing pipelines and other equipment by means of a periodically reversed flow of cleaning fluid is claimed.

6. GAS AND LPG STORAGE

Ethylene

Ethylene Storage and Distribution. Part 2. Large Storage Capacity for Independent Producers. H. C. Schutt and A. R. Mattioli. *Oil Gas J. 56,* 80 (1958) Aug. 25 (4 pp.); **Part 3. Pipeliners Find Favor in Transporting Ethylene.** *Ibid.,* 150 (1958) Sept. 1 (2 pp.)

Independent producer of ethylene, one which produces olefins from byproducts and sells them on demand, should have a reserve supply equivalent to the normal production during four stream days in order to permit convenient scheduling and coordination of maintenance activity by the producer as well as the consumer. Part 3 discusses pipelines as the most practical and economical method of distribution. Marine transportation also is discussed.

Gasoline Storage

Cone-Roof Tankage. E. W. Wilson. *Oil Gas J. 56,* 222 (1958) Aug. 18 (2 pp.)

Breathing, filling and wicking losses have been eliminated and savings estimated at approximately $40,000/annum have been realized by installation of a vapor-recovery system on cone-roof tankage in 8-13 R.v.p. gasoline service.

Underground Storage

Herscher Dome: Storage Despite Leak. *Oil Gas J. 56,* 114 (1958) Aug. 18 (3 pp.)

For five years engineers have been devising methods for finding leaks that have plagued what might have been the world's biggest storage project. Although the problem has not been solved, the leak has been neutralized by construction of a special gas-gathering and treating system. At first it was believed that the Galesville sand could hold 93 billion CF of natural gas; in practice it has held 31 billion, about half of which is usable. Recent pilot tests indicate that the deeper Mount Simon formation may hold as much as 70 billion CF, of which half would be usable.

Shifting Gas Markets. *Gas Heat and Comfort Cooling 9,* 36 (1958) Aug.

Pittsburgh's Home Gas Co. will install and operate storage field lines in an extension of its Dundee Storage Field located in Schuyler, Steuben and Yates Counties. In addition, approximately 19.5 miles of 16-in. transmission line will be constructed.

Shifting Gas Markets. *Gas Heat and Comfort Cooling 9,* 34 (1958) Aug.

Cities Service Gas Co. (Okla.) has been granted temporary authority to develop the Elk City Storage Field in Montgomery County, Kan. Field can be used to supply approximately 50,000,000 CF on the peak day in 1958-59 and 100,000,000 CF on the 1959-60 peak day.

Shifting Gas Markets. *Gas Heat and Comfort Cooling 9,* 34 (1958) Aug.

Natural Gas Storage Co. of Illinois has been granted a temporary certificate for construction of facilities to further develop its Herscher underground storage reservoir in Kankakee County. Project will include 12 injection-withdrawal wells, about 2.4 miles of gathering lines and three observation wells.

7. MANUFACTURED GAS AND CHEMICAL PROCESSING

Aromatics

The Udex Process. H. W. Grote. *Chem. Eng. Progress 54,* 43 (1958) Aug. (6 pp.)

Udex process uses a selective liquid-liquid solvent extraction technique. Process has been commercially proved by application to a variety of feed stocks in many units. In these plants, the aromatic products are of such high purity that "Udex Grade" has come to signify a standard of excellence. Over a dozen commercial Udex units are now processing a variety of feed stocks and a similar number are either in design or construction stages. These range in charge stock capacity from 500 up to 40,000 bbl/stream day.

Coal Gas

Provan Extensions Opened. *Gas J. 295,* 315 (1958) Aug. 13 (6 pp.); **Provan Gasworks, Glasgow.** *Coke and Gas 20,* 308 (1958) Aug. (9 pp.)

Latest extensions will add 7.04 MCF of coal gas/day by the commissioning of 48 continuous vertical retorts and 8 MCF/day of carburetted water gas from a new installation of two automatic units each of 4 MCF/day. Present provan gasworks capacity of 27.5 MCF/day is to be further augmented to 30 MCF/day by coke oven gas.

Coke

Influencing Factors on the Physical Characteristics of Coke. *Gas World 247,* 335 (1958) Aug. 23 (2 pp.)

Valuable information on coking technology can be obtained by means of detailed investigations on the semi-commercial scale. In many cases, however, only tests on the operational large scale will serve to provide a definite clarification. For example, thermotechnical investigations can only be conducted under large-scale operational conditions. On the other hand, where a considerably changed coking coal basis gives rise to fundamental changes in the coking preparation, the hazard with the necessary capital investment can be considerably reduced, if the results obtained on the semi-commercial scale can be subsequently confirmed on the large scale in the test coking plant.

Ethylene

Simplicity and Stability Obtained with Direct-Oxidation Process. G. Weyermuller and J. Simon. *Chem. Processing 21,* 51 (1958) Sept. (2 pp.)

Wyandotte Chemicals ethylene oxide plant near Baton Rouge is first commercial unit to go on stream using Shell process, which offers high efficiency with single reaction stage.

Hydrogasification

Hydrogenator Converts Heavy Oil to Fuel Gas. *Chem. Eng. 65,* 64 (1958) Aug. 25 (3 pp.)

Developed to broaden raw-material base of Britain's fuel-gas supply, non-catalytic, fluid-bed process was piloted in a recently completed 1-million CF/day plant at Solihull. Results indicate that cost of gas produced by a $6.5-million, 7.5-million CF plant to be completed near Manchester, by 1960, will be $.22/therm.

Nitrogen Oxides

The Role of Nitrogen Oxides in Air Pollution. M. S. Peters. Purdue Univ. *Eng. Bulletin 42.* (Proceedings of the Twelfth Industrial Waste Conference), 514 (1958) Sept. (11 pp.)

Photochemical reaction causes atomic oxygen and nitric oxide to be produced. Former combines with molecular oxygen to form ozone, while nitric oxide can react with alkyl radicals present in polluted air to reform nitrogen dioxide. Removal of nitrogen oxides from waste gases can be accomplished by absorption, adsorption and catalytic operations. Article discusses contribution made by nitrogen oxides to air pollution and possible ways of reducing the amount of these oxides emitted to the atmosphere.

Oil Gas

Recent Operating Results of the Segas Cracking Plant at Hamelin. H. Deneke. *Gas- u. Wasserfach 99,* 663 (1958) July (11 pp. German text.)

Supplement to 1956 article on operation of new cracking plant. Descriptive data and operation results support the conclusions that 1) cracking of mineral oil to gas has been developed technically so far that the sensible gap in raw materials could be closed; 2) plant operating safety has been established; 3) maintenance of gas supply is insured by having one of the three plant units always in reserve; 4) decrease in coal consumption by using oil as cracking material aids the coke market, and 5) transfer to automation has reduced price of gas so much that demand has increased.

Oxygen

High Purity Oxygen for Steel Making. J. T. Hugill. *Can. J. Chem. Eng. 36,* 169 (1958) Aug. (6 pp.)

Recent developments in the manufacture of steel require the use of large quantities of high purity oxygen. To supply this demand, new air separation plants have had to be designed and built which are capable of producing oxygen of large tonnage quantities at a minimum purity of 99.5%. Article describes the 100 ton/day oxygen units built for Dominion Foundries and Steel Company at Hamilton, two of which are currently in operation.

Petrochemicals

Journal's Survey of Petrochemical Plants. *Oil Gas J. 56,* 129 (1958) Sept. 1 (12 pp.)

Six-part report is composed of plants using raw materials which are wholly or partially derived from petroleum or natural gas. First five parts contain U. S. plants classified by type of operation. Sixth is a complete report of Canadian plants. Construction planned or underway is included.

Review of Recent USA Patents on Hydrocarbon Oxidation. H. Heinemann and H. Shalit. *World Petrol. 29,* 122 (1958) Sept. (4 pp.)

Review deals with those patents related to hydrocarbon oxidation and is divided into three categories according to whether the patents deal with: 1) paraffin oxidation; 2) olefin oxidation and 3) aromatic hydrocarbon oxidation.

Urea from Steel Mill By-Products. *Can. Chem. Processing 42,* 51 (1958) Aug. (5 pp.)

With the completion of Canada's first urea plant at Hamilton, Ontario, late in 1958, Canada will be another step closer to the goal of self-sufficiency in the production of basic chemicals. To date, Canada's urea requirements have been supplied by imports from the U. S. and overseas. Cyanamid of Canada will take nitrogen, hydrogen and carbon dioxide from Dofasco's steel operations to make ammonia and urea.

Petroleum Refining

Particle Size Control in Fluid Coking. D. D. Dunlop, L. I. Griffin, Jr. and J. F. Moser, Jr. *Chem. Eng. Progress 54,* 39 (1958) Aug. (5 pp.)

Theory and laboratory work involved in solution of the particle size control problem in fluid coking are discussed. Mathematical models of particle size growth are used to determine "seed" coke requirements.

West German Refinery Capacity Rose 12.4% in 1957. A. M. Stahmer. *World Petrol. 29,* 76 (1958) Sept. (4 pp.)

West German Federal Republic boasts new plants which are being designed for maximum fuel-oil recovery and which are equipped with catalytic reformers and desulfurizers. During the next three or four years the crude processing capacity of the country — which at the end of 1957 amounted to 116 barrels per annum — will be doubled or possibly even trebled.

Plant Wastes

Loadings and Efficiencies in the Biological Oxidation of Spent Gas Liquor. E. H. M. Badger and M. I. Jackman. *Coke and Gas 20,* 316 (1958) Aug. (8 pp.)

Efficiencies of destruction of O/A and total phenols at various loadings in the biological oxidation of spent gas liquor were determined at five temperatures in the range of 25-47°C. At 30°C, the O/A loadings into intensively aerated pots were 5-15 times as great as those previously reported for percolating filters for the same efficiency of destruction. When the liquor feed was diluted with an equal volume of water or, alternatively, was treated with ferric chloride either before or after a first stage biological oxidation, the thiocyanate could be successfully oxidized in a second stage. Further reduction in O/A and removal of color can be obtained by a final treatment with ozone or by passing the liquor through a suitable resin.

New Waste Disposal Process. F. J. Zimmerman. *Chem. Eng. 65,* 117 (1958) Aug. 25 (4 pp.)

Process burns organic matter, including wastes, in dilute aqueous solution, directly with high-pressure air. Operating and excuss power and steam are self-generated; odorless, low oxygen demand effluent is discharged.

Reformed Gas

The Use of Refinery Gas in the South of France. J. Bianchi. *Coke and Gas 20,* 324 (1958) Aug. (9 pp.)

Between World War I and World War II, the refinery industry in France assumed considerable importance. Four important refineries were built along the Mediterranean coast: Lavera, La Mede, Berre and Frontignan. After World War II, these refineries were reconstructed and modernized and in 1956, their total treatment capacity exceeded 10 million tons of crude oil. Article describes methods employed in the gasworks to supply the distribution mains either partially or completely from the gases derived from the treatment of oil.

Sulfur Oxides

Sulfur Dioxide—Its Chemistry and Removal from Industrial Waste Gases. D. Bienstock, L. W. Brunn, E. M. Murphy and H. E. Benson. *U. S. Bur. of Mines Inf. Circ. 7836* (1958).

Bureau of Mines and U. S. Public Health Service are participating in a project for development of processes that remove sulfur dioxide from gaseous effluents or minimize their noxious and toxic properties. Report serves as annotated bibliography and contains a compilation of published information on the chemistry of sulfur dioxide, emphasizing reactions having current and potential application. Major absorption processes developed or in pilot-plant stage are discussed. Processes for removing sulfur dioxide, when present in considerably greater concentrations, as in smelter off-gases, are also explained.

Water

Corrosion and Water Purity Control for the Army Package Power Reactor. R. J. Clark and A. L. Medin. *Corrosion 14,* 419t (1958) Sept. (5 pp.)

Army Package Power Reactor is a 10 MW heat rated system designed to produce 2000 KW of electricity. Reactor, which has been in operation since April 1957, is a pressurized water system. Problems facing the designer of such a system in the fields of corrosion and water purification are presented.

Saline Water Conversion by Freezing. H. M. Hendrickson. *Refrigerating Eng. 66,* 31 (1958) Aug. (8 pp.)

Three-phase research program on processes for desalting of sea water by freezing was conducted to 1) study literature on the subject; 2) conduct field tests with sea water on commercial and industrial ice makers of all available types, and 3) set up several ice makers in the laboratory to study their performance under more accurately controlled conditions and to determine the best methods for separating the entrapped salt from the ice-brine mixture obtained by freezing. Economic studies were conducted of the most promising cycles.

Acetylene

Process for Making Sodium Carbonate and Acetylene. J. A. Neubauer and F. W. Theis (assigned to Columbia-Southern Chemical Corp.) U. S. 2,845,-329 (1958) July 29.

In making sodium carbonate and acetylene, an integrated method is claimed in which calcium carbonate is calcined. Carbon dioxide thereby produced reacts with ammonia in a solution of sodium chloride to produce ammonium chloride and sodium bicarbonate. The former is separated and the latter is decomposed to sodium carbonate and carbon dioxide. Some lime from first calcination is reacted with carbon to produce a calcium carbide and CO. The carbide reacted with water yields acetylene and calcium hydroxide, which is reacted with ammonium chloride produced above to yield ammonia with which the above cycle can be repeated.

Nitrogen

Removal of Nitrogen from Natural Gas. H. W. Habgood (assigned to Canadian Patents and Development Limited). U. S. 2,843,219 (1958) July 15.

Nitrogen is removed from a nitrogen-methane mixture by contacting latter with a moving bed of granular molecular sieve material (sodium aluminum silicate) with properties such that the ratio of rate of sorption to partial pressure is initially greater for nitrogen than for methane. Gases are removed before equilibrium is reached and an unsorbed methane-rich gas is recovered.

Reformed Gas

Refractory Regenerative Catalytic Process. R. L. Hasche. U.S. 2,846,296 (1958) Aug. 5.

Highly efficient apparatus for the catalytic reforming of natural gas and petroleum hydrocarbons for the production of heating or synthesis gas is described. Gas with heating values of from 300-530 Btu/CF can be produced.

Regenerative Processes and Apparatus. R. L. Hasche (assigned to Koppers Co., Inc.) U.S. 2,845,335 (1958) July 29.

Design for regenerative, cyclic, endo- or exo-thermic reaction processes is claimed. Reaction zone may be provided with catalytic material or with inert regenerative mass, as required by the process.

Shale Oil

Fluid Retorting Process. J. W. Scott, Jr. and J. B. Cull (assigned to California Research Corp.) U. S. 2,844,525 (1958) July 22.

Improved retorting process is claimed for oil shales and other bituminous solids in which the fresh shale charged to a steam-fluidized retort is heated to volatilization temperature by an excess of finely divided burned shale residue from a separate kiln zone. Such burned shale recirculation prevents degradation or agglomeration of fresh shale and permits stable fluidization by elutriation of coarse materials from both retort and kiln zones.

Process for Recovery of Oil from Shale. J. Stewart, S. C. Fulton, E. and A. W. Langer, Jr. (assigned to Esso Research and Engineering Co.) U.S. 2,847,306 (1958) Aug. 12.

Oil is recovered from shale by pulverizing shale and slurrying it with a partly hydrogenated thermal tar (from cat cracker bottoms) with a 600°-900°F boiling range, heating the slurry and soaking at 750°-950°F at 200 psig for 30 minutes-10 hours. A similar but lower boiling tar is added to extract the oil, the oil is settled out, extracted shale is steam-stripped and the stripped shale is burned to provide heat.

Synthesis

Internal Combustion Engine for the Production of Synthesis Gas. O. Herwig (assigned to Maschinenfabrik Augsburg-Nurnburg A.G.) U.S. 2,846,297 (1958) Aug. 5.

Plant for generating synthesis gas and producing mechanical power is claimed. Plant is comprised of an internal combustion engine having separate sources of fuel, oxygen and air, a fuel-oxygen mixture tank connected with fuel and oxygen sources, a valve system for selectively connecting fuel and air sources to the engine or for connecting the mixture tank to the engine for supply either a substantially entirely combustible fuel-air mixture or a partially combustible mixture adapted for generation of synthesis gas.

Tar Bases

Recovery of Ammonia and Pyridine. R. P. Langguth (assigned to Monsanto Chemical Co.) U.S. 2,849,288 (1958) Aug. 26.

Ammonia and pyridine are recovered from coke oven gas by passing latter through a first zone of aqueous phosphoric acid saturated with diammonium phosphate and maintained at *p*H of 5-8 to precipitate ammonia as diammonium orthophosphate, then passing outlet gases to a second absorbing zone held at *p*H 3.0, after which ammonia is passed into the solution formed in the second absorbing zone, thereby causing separation of a pyridine phase.

8. GAS DISTRIBUTION

Distribution Systems

Northern Ontario Natural Gas Passes Halfway Mark in Linking 32 Towns. *Gas Age 122,* 32 (1958) Sept. 4 (2 pp.)

Gas to northern Ontario markets by mid-October is goal of the Ontario distributor as it and supplier Trans-Canada Pipelines push completion of respective lines. Halfway mark in distributor's $15,000,000 pipeline laying program was passed in early August. Scheduled for completion by September 15, construction job will bring gas to homes and factories in 32 Northern Ontario communities by October 15.

Product Round-Up . . . Utility Trenchers and Backhoes Have Many Money Saving Features. *Gas Industries 2,* 8 (1958) Sept. (2 pp.)

Special feature on small utility trenchers, used primarily for digging house line trenches, and truck and tractor mounted backhoes now popular with gas utilities.

LPG

How to Cut Delivery Costs. C. Abell. *Butane-Propane News 20,* 23 (1958) Sept. (5 pp.)

Article serves as introduction to a series in special "Transportation Issue." Directed toward LP dealers, topics include light weight trucks, tires, two-way radio, preventive maintenance, cylinder delivery, pumping time and LPG truck servicing. Objective: to arrive at lowest possible cost for delivery of a gallon of gas.

Metering

Orifice Metering. H. Elayer. *Instruments and Automation 31,* 1378 (1958) Sept. (5 pp.)

Orifice metering fundamentals include the basic derivation of the head-velocity relationship. Causes for error are examined, including the effects of deviations in standard structural techniques. Visualization of the physical system can help in proper analysis of metering problems.

Venting a Gas Pressure Regulator. F. J. Lowe, Jr. *Gas Heat and Comfort Cooling 9,* 32 (1958) Aug. (2 pp.)

Most generally accepted device for regulator venting is described as a leak limiting device. It may be either a plain plug with a specially drilled orifice or an automatic type designed to vent into the general area under normal operations but to close off if the diaphragm ruptures. No such device is acceptable that can release gas in excess of 1000 Btu/hr.

Peak Load

Engineering and Economic Factors in Choosing a Peaking Gas Process. R. Kyle and P. W. Havenstein. New York: A. G. A. Operating Section Proceedings; Paper No. CEP-58-10 (1958) May; Choosing a Peaking Gas Process. *Am. Gas J. 185,* 21 (1958) Sept. (6 pp.)

Factors to consider: determination of maximum daily demand and number of full days operation in terms of sendout gas or natural gas equivalent. Article uses one operating utility needing a peak generating capacity of 10,000 MCF/day natural gas equivalent (at 1000 Btu/CF). Annual peak gas production is projected to extend through ten 24-hour days. Seven gas manufacturing processes are selected as being representative of what is available to the industry.

Piping

How About Using Thin-Wall Pipe? R. S. Ryan. *Oil Gas J. 56,* 68 (1958) Aug. 25 (2 pp.)

Recent experience indicates that thin-wall pipe can be used in construction without difficulty, and that there is no additional construction cost with thin-wall pipe in comparison with conventional wall-pipe. More and more natural gas companies are leaning toward the use of thinner-wall pipe because there is considerable material savings possible.

How Much Plastic Piping in Use? *Can. Chem. Processing 42,* 61 (1958) Aug. (3 pp.)

Survey completed this summer indicates that 41 of 56 firms in Canada replying to a questionnaire on plastic pipe experience are currently using this commodity in their operations. Of the remaining 15 firms, 12 indicated one or more potential applications. Survey shows that plastics is becoming an important material for Canadian process industries in cold water lines, corrosive traps.

Metering

Combination Regulator and Meter Index Ring Mounting. P. V. Resko and F. Whitworth (assigned to Sprague Meter Co.) U. S. 2,844,962 (1958) July 29.

Combined register cover and pressure regulator for gas meters is claimed which is designed as a simple casting to fit the meter top and provide an easily readable index and effective regulation for curb box installations.

Temperature and Pressure Compensating Device for Gas Meters. C. W. Stewart (assigned to Sprague Meter Co.) U. S. 2,844,963 (1958) July 29.

Temperature-pressure compensating device for gas meters is claimed, which consists of a pair of expandable V-pulleys, one connected to the metering (diaphragm-driven) spindle and the other to the index spindle. Each pulley consists of a fixed portion and a moveable portion activated by a Sylphon bellows. The pulley pairs are connected by a driving V-belt. Temperature changes cause the one Sylphon to separate the pulley halves and the other to bring its pulley-halves together, thus changing the pulley ratio and the speed of the index. Pressure changes produce a converse action by the Sylphons.

9. GAS FUEL UTILIZATION AND APPLIANCES

Air Pollution

Photochemical Secondary Reactions in Urban Air. P. A. Leighton and W. A. Perkins. San Marino, Calif: The Air Pollution Foundation (1958) Aug. (Report No. 24)

Study of photochemical secondary reactions includes those in which the reactant concentrations are indirectly as well as directly dependent on light absorption. For each reaction the existing information regarding products, mechanism and rate is reviewed, and wherever possible the reaction rate is used as a basis for judging its importance in urban air. Among the reactions of definite and possible significance are those of oxygen atoms with molecular oxygen to form ozone, of ozone with nitric oxide and with olefins, and of free radicals with oxygen, nitric oxide and olefins. A mechanism based on these reactions is capable of producing the observed diurnal variations in ozone concentration in the air, and of accounting in part at least for other smog formation phenomena. Because of the ozone-olefin reaction, the free radical concentration may remain at a substantial value for some time after illumination has been cut off. Removal of aldehydes alone might appreciably retard smog formation in urban air.

Appliances

Directory of Gas Heating and Air Conditioning Manufacturers; Equipment and Trade Names. *Gas Heat and Comfort Cooling 9,* 70 (1958) Aug. (46 pp.)

Three-part directory is comprised of an alphabetical list of all gas-fired equipment manufacturers and manufacturers of accessory equipment, including name, address, principal officers and telephone numbers; a second section or product directory showing manufacturers of each of several types of product, and a third section of trade names of gas-fired products in common use.

Flame Research

An Analytical Study of Turbulent and Molecular Mixing in Rocket Combustion. D. A. Bittker. Washington: National Advisory Comm. for Aeronautics Tech. Note 4321 (1958) Sept.

Approximate calculations for the diffusion of gases have been performed to obtain an idea of the importance of gaseous mixing in rocket combustion. Mixing lengths for two simplified diffusion models are calculated for various turbulence conditions. Results are independent of any particular propellant combination. With sources in a single injection plane, mixing occurs in less length than is needed for evaporation of typical engine sprays. When downstream sources are used to simulate vaporization within the chamber, mixing is more signficant. Calculations only indicate the magnitude of the effect since the models are greatly simplified.

Flow Field of a Bunsen Flame. M. S. Uberoi, A. M. Kuethe and H. R. Menkes. *Phys. of Fluids 1,* 150 (1958) Mar.-Apr. (9 pp.)

Flow field of a two-dimensional Bunsen flame is examined by approximating the zone of combustion by a surface of discontinuity across which the density drops and normal velocity increases Even though the flow of unburned gases is potential, the flow of the burned gases is always rotational and therefore is not amenable to complete analysis. Interaction of flame shape and flow field is obtained analytically and experimentally. Entire flow field of unburned and burned gases is mapped by taking stroboscopic photographs of small particles suspended in the combustible gases. Measured flow field is considered in the light of the above analysis.

Furnaces

Combination Gas-Electric Tower Furnace Used for Continuous Annealing of Tin Plate. *Ind. Heating 25,* 1574 (1958) Aug. (2 pp.)

Six-story high combination gas-electric furnace is used for continuous annealing of tin plate strip in a protective atmosphere. It consists of heat-up, soak-out, cooling, fast cooling and quench chambers. New furnace is rated at 15 tons/hr for 0.01-in. by 30-in. strip moving at 500 ft/min. It is designed for later expansion and when eventual conversion is effected,

the capacity will be increased to 30 tons/hr at a maximum rate of 1000 ft/min.

Indirect Gas-Fired Furnaces for High Temperature Processes. A. H. Koch. *Ind. Gas 37,* 2 (1958) Aug. (4 pp.)

Facts on brazing, sintering, stainless steel heat treating, carburization and furnace equipment. Many newly created processes and more extensive utilization of older methods involve heating to temperatures above 1850°F. These higher temperatures require that heat treating processes be carried out in prepared atmospheres to eliminate costly subsequent operations for removal of deteriorated surfaces.

Heat Treating

Sheet Aluminum Parts for Missiles Heat Treated in Large Salt Bath. *Ind. Heating 25,* 1552 (1958) Aug. (2 pp.)

New salt bath furnace, 18 ft by 5 ft by 8 ft, is used to heat treat sheet aluminum parts for F8U Crusader Navy fighters and Regulus guided missiles. Sodium and potassium nitrate salt is melted by firing six immersion type gas heaters alongside the tank. Melted salt is kept in molten state 24 hours a day.

Industrial Heating

Biscuit Manufactory Consumes 150 Mill Cu. Ft. of Gas A Year. *Gas J. 295,* 107 (1958) Aug. 6 (6 pp.)

Famous British biscuit manufacturer realized potentials of gas as an ideal form of fuel for his operation. Plant utilizes variety of gas-fired equipment and today requires 150 MCF of gas/annum. Description of operation and equipment.

Natural Gas Aids Development and Growth in North Carolina. A. Q. Smith. *Ind. Gas 37,* 7 (1958) Aug. (9 pp.)

In the few short years natural gas has been available in the territory served by the Public Service Co. of Northern Carolina, Inc., there has been almost universal acceptance of this fuel for industrial processing, volume feeding and other operations. Industries that have converted to natural gas include Lithium Corp. of America, Firestone Textiles, Inc., Ferguson Gear Co., Sanford Brick & Tile Co., Pomona Terra Cotta Co., Saco-Lowell Shops, Southern Screw Co., Empire Manufacturing Corp. and J. C. Steele and Sons, Inc.

Gas Plays Many Vital Roles in Modern Food Can Production. *Gas J. 295,* 94 (1958) Aug. 6 (5 pp.)

Among the various operations in production of food cans, color printing and varnishing the exterior designs, and lacquering the interior are important. Because tinplate is nonabsorbent, large-scale stoving plant is needed for drying and hardening finishes. Controlled stoving of the sealing compound and application of heat for soldering also must be considered. Article describes one manufacturer's preference for gas for his operations.

Motor Fuel

Power Economy Problems. H. A. Reinhart. *LP-Gas 18,* 52 (1958) Sept. (5 pp.)

Technical discussion of differences in gasoline vs propane engine performances. Salient points in favor of propane are presented, as well as problems that are often encountered.

Space Heaters

A Short Course in LP-Gas Controls. W. B. Berg. Part 1. *LP-Gas 18,* 48 (1958) July (7 pp.); Part 2. *Ibid.,* 64 (1958) Aug. (5 pp.); Part 3. *Ibid.,* 63 (1958) Sept. (7 pp.)

Quiz technique is utilized in three-part series to review for reader basic circuitry and control theory (Part 1), knowledge of controls for water and space heaters (Part 2) and of forced warm air systems and zone control (Part 3).

Air Pollution

Incineration Apparatus and Method. A. I. Bratton (assigned to Oxy-Catalyst, Inc.) U.S. 2,845,882 (1958) Aug. 5.

Improved catalytic device is utilized to oxidize the objectionable components in incineration combustion products, resulting in essentially smoke and odor-free operation. An improved combustion air control also is described.

Cookers

Gas-Fired Grill and Broiling Method. E. J. Haedike and S. Zavodny (assigned to Mid-Continent Metal Products Co.) U.S. 2,848,990 (1958) Aug. 26.

Broiler is described comprising an open metal grill and a grate of refractory lumps heated to incandescence by a multi-nozzle gas burner. Air jets blast across the grate (below grill) to control combustion of grease drippings.

Furnaces

Furnace Structure. J. Kniveton (assigned to Selas Corp. of America) U.S. 2,848,206 (1958) Aug. 19.

Improved walking-beam type of furnace is claimed in which the floor is roller-mounted on a supporting frame to permit free change in length by expansion and contraction, besides controllable horizontal and vertical movement.

Strip Heating Apparatus. F. O. Hess (assigned to Selas Corp. of America) U.S. 2,848,205 (1958) Aug. 19.

Improvements in continuous uniform heating of strip steel are obtained by moving the strip downward through a preheating chamber where the hot gases rising from the final heating chamber below are deflected by shaped channeled walls to heat the strip to different temperatures from edge to edge.

Ore Reduction

Process for Smelting Ores. W. Wenzel. U.S.2,846,-300 (1958) Aug. 5.

Improved iron ore reduction process is claimed in which the suspended burning coal ore and lime are maintained in a melting zone with CO_2 and steam at slightly lower than the equilibrium concentration and allowing the melted products to settle through a hot coke bed. Off-gases are used to pretreat the raw ore.

Water Heater

Flue for Gas Water Heaters. A. C. Ernst (assigned to Meat Packers Equipment Co.) U.S. 2,847,953 (1958) Aug. 19.

In a vertical water heater with a hot gas flue extending axially upward through the tank, heat transfer is greatly improved by vertically corrugating the usual cylindrical flue wall with rounded or lobed corrugations, and suspending in the flue several baffle plates which clear the inwardly projections except for several outwardly projecting lobes or tongues which project into the outward corrugations. These tongues are circumferentially offset on adjacent baffles to cause a lateral zigzag motion of hot gases.

10. EQUIPMENT AND INSTRUMENTATION

Automation

Converting Pulse and Coded Data into Usable Output Signals. H. W. Mergler. *Control Eng. 5,* 146 (1958) Sept. (7 pp.)

In many recorded information program controllers, the stored command intelligence is in the form of pulse or coded data. These data must be manipulated to suit internal requirements of the programmer and then converted to a usable output signal that will force the controlled variable to follow the recorded command. To design the internal programmer networks, a control engineer must be familiar with the relative merits of the various language forms and with techniques for code-form conversion, code-to-code conversion, scalar and arithmetic manipulation of numerical control data and the methods of converting these data into proportional analog quantities for closed-loop control. Article covers these items.

Selecting Punched Tape or Punched Card Equipment for Program Control. L. H. Young. *Control Eng. 5,* 128 (1958) Sept. (6 pp.)

Punched media—tapes and cards—serve best in control applications in which the program is variable. Article first discusses when to use punched media in controlling automatic processes; then considers the application of punched tape versus punched card to control sequential operations. Finally it describes and compares commercially available equipment—punches, readers and accessory equipment—that a designer can choose for a particular application.

Contactors

Pressure Drop through Bubble Caps. H. T. Welch. *Petrol. Refiner 37,* 127 (1958) Aug. (6 pp.)

Based on the fundamentals of fluid flow, approach enables attainment of consistantly good results from pressure drop calculations. Author has obtained experimental data to account for aeration.

Distillation

Instrumentation and Control of Distillation Columns. T. J. Williams. *Ind. Eng. Chem. 50,* 1214 (1958) Sept., Part 1. (9 pp.)

There has been a recent tremendous development in instrumental methods of analysis. Resultant direct and rapid measurement of composition, rather than the previous measurement of environment-influenced properties such as temperature, furthers those methods of control prescribed as a result of theoretical studies. From theoretical considerations an optimum control arrangement has been developed for a distillation column and results of theoretical studies have been used to list recommended practices for the automatic control of a column.

High Pressure

High-Pressure Techniques. D. M. Warschauer and W. Paul. *Rev. Sci. Instruments 29,* 675 (1958) Aug. (5 pp.)

Information on hydrostatic pressure techniques up to 20,000 kg/cm^3 under two headings: general pressure techniques (low temperature seals with small diameter tubing, pressure measuring bridge and various tubing seals) and optical techniques (optical windows of sapphire, germanium and silicon, suit-

able pressure fluids, and a mechanism for moving samples inside a pressure vessel for use to 10,000 kg/cm³.)

Instruments

Instrumentation of a Chemical Process. A. Pollard. *Chem. Process Eng. 39,* 281 (1958) Aug. (4 pp.)

Discussion of instrumentation necessary for control of a simple chemical process, the process being hypothetical. Article cautions that if a chemical process plant is to be automatically controlled, consideration of this at the design stage is essential. Idea that instruments can be added to the plant during, or even after, erection has almost disappeared. Noticeable tendency is toward excessive automation of new plant.

Logging

New Ethylene Plant Adopts Data-Handling Unit. *Chem. Eng. 65,* 84 (1958) Aug. 11 (3 pp.)

Offering major operating improvement, Phillips Petroleum Co.'s new data handling system lays the basis for eventual change to "closed-loop" computer controlled operation. Installation scans signals from 400 instruments, logs values periodically and gives alarm of upsets. In addition, it totalizes flows to provide accounting department with material balance information, corrected to standard temperature and pressure.

Pilot Plants

How to Cut Testing Costs in Half. *Petrol. Week 7,* 32 (1958) Aug. 15 (3 pp.)

Pair of pilot plants are cutting catalyst testing costs in half. One screens out all but the most promising catalysts, and the other then automatically tests and records performance behavior.

Selecting the Kind and Size of Pilot Plants. N. Fragen, G. H. Weisemann, and K. C. Peterson. *Chem. Eng. Progress 54,* 65 (1958) Aug. (3 pp.)

How to reduce development costs and how to reduce the time required to commercialize processes in the building of petrochemical pilot plants . . . case history of one company, which adhered to several general practices and effected such results.

Piping

Advanced Approach Simplifies Piping Flexibility Analysis. E. A. Wert. *Heating, Piping & Air Conditioning 30,* 130 (1958) Sept. (4 pp.)

High costs plus trend toward high temperature-pressure conditions and process applications involving flow of corrosive fluids have increased need for advanced piping technologies. Standardized procedure is criterion for design. Article outlines two methods, graphical and algebraic, which may be used to analyze piping systems for correct stress with acceptable reactions.

Process Design

For Your Next Purification Problem . . . Crystallization. D. E. Garrett and G. P. Rosenbaum. *Chem. Eng. 65,* 125 (1958) Aug. 11 (16 pp.)

Latest data on process theory, equipment selection and costs. Article is aimed primarily at design and development engineers, but operating men also will find things of interest. Special articles cover design and operation, study of a process, design and selection of equipment and today's costs.

Reactor

An Isothermal Catalytic-Conversion Unit. W. J. Cerveny and W. C. Pfefferle. *Ind. Eng. Chem. 50,* 1255 (1958) Sept., Part 1 (2 pp.)

Small-scale thermal unit for studying catalytic conversions performs well with little maintenance. It is designed for maximum pressures of 3000 psi and temperatures of 1000° F. Narrow annular catalyst bed offers a simple solution to the problem of studying highly endothermic and exothermic reactions under essentially isothermal conditions. Reactor is sufficiently flexible to be used for many types of catalytic studies.

Steam Generation

The CO Boiler of Standardized Design. T. J. Harvey and P. C. Trounce. *Combustion 30,* 34 (1958) Aug. (6 pp.)

Regeneration of the catalysts in modern refineries imposes special problems from the control of regenerator bed temperatures to the disposal of large quantities of a low Btu gas. The CO boiler has put the low Btu gas together with its sensible heat to economic use. Article tells how the refinery engineer has applied this boiler to circulating catalytic systems and yet retained the boiler's independence so it can be fired alone when the regenerator is shut down.

Temperature Measurement

Error in Temperature Measurement due to the Interdiffusion at the Hot Junction of a Thermocouple. A. J. Mortlock. *J. Sci. Instruments 35,* 283 (1958) Aug. (2 pp.)

Temperature measurement errors due to interdiffusion at the hot junction of a thermocouple are discussed and corresponding theoretical expressions derived. Applying these it is found, for example, that

a platinum/platinum-13% rhodium thermocouple in a gradient of 10°C/cm may be in error to the extent of about 1.3°C at all temperatures within the normal operating range following a heat treatment equivalent to 100 days at 1500°C. This is so only if the thermocouple is used in the conventional way with its arms parallel. If the same thermocouple were operated with its arms arranged in an antiparallel fashion, the error would be less.

Grinding

Fluid Energy Grinding. L. T. Work (assigned to Texaco Development Corp.) U.S. 2,846,150 (1958) Aug. 5.

Coarse particles of coal, talc, barite, light metals, clay and even oyster shells can be reduced in size by passing through a long, small diameter steel grinding tube at high velocity. Variation of this method is proposed, where the size reduction is accomplished by 180° collision of multiple high velocity streams of the suspended material.

Industrial Heating

Treatment of Carbonaceous Solids. M. F. Nathan (assigned to M. W. Kellogg Co.) U.S. 2,844,886 (1958) July 29.

Process has been developed for drying and preheating of carbonaceous solids, such as coal, shale, oil sands, etc., in the fluidized state. This is a required part of the operation of many processes for the conversion of solid materials to valuable liquid or gaseous products.

11. MATERIALS OF CONSTRUCTION, AND CORROSION

Cathodic Protection

Cathodic Protection under Present Freight Conditions. *Corrosion Tech. 5,* 254 (1958) Aug. (3 pp.)

With freight rates at their lowest in many years, major tanker companies are still continuing to fit cathodic protection in their new constructions. One of the systems being fitted is that of Seaguard Ltd., who are at present fitting their black oil cathodic protection scheme to vessels ranging from 3400 tons-42,000 tons in Britain as well as throughout the world.

Economics of Underground Corrosion Control in Union Gas System. R. E. Kuster. *Pipe Line News 30,* 43 (1958) Aug. (4 pp.)

Specific case history of savings attained using cathodic protection on existing transmission and distribution underground plant. Advantages to be gained by using high grade coatings supplemented by cathodic protection wherever possible at the time of construction are outlined. Emphasis on continuing program of corrosion control instrumentation, construction and maintenance checks.

Rectifier Fundamentals for Service Men. E. L. Newmyer. *Am. Gas J. 185,* 35 (1958) Sept. (3 pp.)

Discussion is aimed at non-technically trained man to help him understand essential operation of a rectifier used for cathodic protection. Some of the more important points to be considered during installation, routine servicing and trouble-shooting are covered.

Reducing Cathodic Protection Costs in Tankers. L.R. Page. *Corrosion Tech. 5,* 257 (1958) Aug. (3 pp.)

Current low freights in the shipping industry have tended to produce a slackening of interest in the latest developments in marine corrosion control, and cathodic protection in particular. Amount of capital apportioned to corrosion prevention has been decreased in some cases so much as to cause major cathodic protection companies to revise their systems to meet such cases, and a number of tanker owners themselves to apply their own anode systems, having a considerably reduced current density criterion than that suggested as being the minimum permissible by the more experienced operators.

Corrosion

A Close Look at Filiform Corrosion. J. D. Sudbury, O. L. Riggs and J. F. Leterle. *Oil Gas J. 56,* 118 Sept. 8 (5 pp.)

Filiform corrosion is highly directional and is characterized by the formation of long, narrow, hollow, threadlike filaments of the corrosion product. It is a special form of an oxygen concentration cell. A specially developed inhibitor controls this corrosion as shown by two field tests.

Review of Gas Condensate Well Corrosion Problem. D. R. Fincher. *Corrosion 14,* 403t (1958) Sept. (2 pp.)

Present status of corrosion control in gas condensate wells is summarized and compared with information reported from other sources. Emphasis is placed on the "super" high pressure condensate well with shut-in pressure in excess of 5000 psi.

A 45-Year Study of Underground Corrosion. *Gas Age 122,* 21 (1958) Sept. 4 (6 pp.)

Review of the research program conducted for the last 45 years by the National Bureau of Standards. Current research emphasizes basic processes and

principles. Two of the current projects are being conducted in cooperation with the Corrosion Research Council in their efforts to increase emphasis on the basic principles underlying corrosion. This work is included in the review.

Inhibitors

The Study of the Passivity of Metals in Inhibitor Solutions, Using Radioactive Tracers. Part 1. The Action of Neutral Chromates on Iron and Steel. D. M. Brasher and A. H. Kingsbury. *Trans. Faraday Soc. 54,* 1214 (1958) Aug. (9 pp.)

Using potassium chromate labelled with Cr^{51}, it has been shown that, during immersion of steel in chromate solution, logarithmic growth of an oxide film, containing chromic and iron oxides, proceeds in a manner similar to that of oxide film growth in air. Work also indicates the presence of an adsorbed Cr-containing layer. It is concluded that inhibition is maintained as long as the concentration of chromate ions in the solution (or presence of the adsorbed layer) can sustain uninterrupted and orderly growth of the oxide film.

Insulation

Foamed Pure Silica . . . Promising New Insulation and Refractory. *Ind. Heating 25,* 1615 (1958) Aug. (5 pp.)

Through success in causing pure silica to boil and foam, Pittsburgh Corning Corp. has created an entirely new acid-resistant insulation and refractory material, which is 99% pure fused silica with a cellular structure. Properties are tabulated.

12. ANALYTICAL METHODS AND TESTS

Catalysts

Determination of Arsenic in Petroleum Fractions and Reforming Catalysts. D. Liederman, J. E. Bowen and O. I. Milner. *Anal. Chem. 30,* 1543 (1958) Sept. (4 pp.)

Arsenic content of naphtha and reforming catalysts is determined by sulfuric acid-hydrogen peroxide oxidation, the catalyst being previously fused with sodium peroxide and separated by distillation as arsenic trichloride. Final color is developed as the arsenic-molybdenum complex. Sensitivity ranges between 0.02 and 40 gamma.

Chromatography

Chromatographic Gas Analyser-Recorder. M. Velut and J. Jourda. *Gas J. 295,* 270 (1958) Aug. 6 (3 pp.)

Janek method was utilized and two columns were employed because operation at ordinary temperatures is desired. Activated carbon thus permits detailed separation of incondensible gases up to CH_4 (except O_2/N_2). Gammagel gives incondensable with CH_4 en bloc but detailed separation of the hydrocarbons C_2, C_3 and C_4. Filling the column with gammagel over a length of several centimeters with silica gel gives a clean and excellent separation of ethane and ethylene. Gammagel may be replaced by the activalum S17.

Gas Chromatography for Trace Analysis. J. D. Boggus and N. G. Adams. *Anal. Chem. 30,* 1471 (1958) Sept. (3 pp.)

Technique and apparatus are described for determination of trace components in solutions by gas-liquid chromatography. Method utilizes a concentrating step wherein major component is removed by venting. Trace components in concentrations as low as 1.0 ppm are determined.

Gas Odorants Analysis by Gas Chromatography. C. F. Spencer, F. Baumann and J. F. Johnson. *Anal. Chem. 30,* 1473 (1958) Sept. (2 pp.)

Mercaptans and sulfide commonly found in commercial gas odorants are analyzed by gas-liquid partition chromatography. Retention time data are recorded. Method indicates a quantitative accuracy of $\pm$ 5%.

Theory of Chromatography. Part II. Enrichment of Isotopes by Chromatography. E. Glueckauf. *Trans. Faraday Soc. 54,* 1203 (1958) Aug. (3 pp.)

It is shown that the isotope separation data obtained by elution chromatography can be represented by a linear plot of the log of the local separation coefficient as ordained against the fraction of the eluted mixture on a probability scale abscissa. This technique of evaluation has been applied to the Na^{24}-Na^{22} separations by Betts, Harris and Stevenson.

Gas Analysis Sampling

Investigation of Sampling Procedure Requirements. A. D. Little, Inc. New York: A.G.A., 1957 (Nov.)

Removal of a particle-laden gas sample from a gas stream without regard for possible sampling error may result in a non-representative sample. Incorrect sampling velocity, bends in the sampling line, settling of particles, heating or cooling of the sample and improper orientation of the sampling nozzle are fac-

tors which contribute to error. Report establishes requirements for best sampling, based upon research and upon literature concerned with particle technology. Recommendations for sampling procedures under practical operating conditions are included.

Mass Spectrometer

A Mass Spectrometer Mass Marker. J. H. Beynon. *J. Sci. Instruments 35,* 289 (1958) Aug. (3 pp.)

An instrument has been designed which utilizes the galvano-magnetic effect in bismuth to measure the field strength of a mass spectrometer magnet, and hence to determine the masses of peaks as they occur when the spectrum is scanned by variation of the magnetic field strength at constant accelerating voltage. Bismuth coil is mounted between the pole-pieces of the magnet and the instrument marks on the mass spectrum a series of 50 mass calibration points at predetermined values of bismuth resistance and hence a magnetic field. Masses can be determined with the instrument to ± 0.05 mass unit in the range up to mass 200 and to an accuracy of ± 0.025% above this range.

Nitrogen

Determination of Trace Quantities of Nitrogen in Petroleum Fractions. O. I. Milner, R. J. Zahner, L. S. Hepner and W. H. Cowell. *Anal. Chem. 30,* 1528 (1958) Sept. (3 pp.)

Trace amounts of nitrogen in petroleum fractions are determined by extraction with 92% sulfuric acid and Kjeldahl digestion. Following re-extraction in acid a blue indophenol color is developed and measured at 625 mμ. Reproducibility is within 0.14 ppm for solutions containing 0-3 ppm nitrogen.

Petroleum Analysis

Micromethods for Analysis of Petroleum. A. R. Javes and C. Liddell. *Anal. Chem. 30,* 1570 (1958) Sept. (6 pp.)

Scheme of analysis is developed for crude oil assays using 5 milliliters of sample. Methods include specific gravity, aniline point, aromatic content, asphaltene content, bromine number, pour point, setting point and viscosity. Results agree favorable with value from conventional methods. Principal source of error is in handling volatile distillates and viscous residues.

Plant Wastes

Chemical Oxygen Demand of Petrochemical Wastes. Modification of the Standard Catalytic Reflux Procedure. F. W. Bertram, O. T. Carlisle, J. E. Murray, G. W. Warren and C. H. Connell. *Anal. Chem. 30,* 1482 (1958) Sept. (4 pp.)

Dichromate reflux procedure, which employs a silver catalyst for determining chemical oxygen demand in industrial waste water, is modified to eliminate chloride interference. Chlorides are compensated for by initial oxidation with dichromate in the absence of silver sulfate catalyst. After refluxing one hour, catalyst is added. Modification offers a more complete oxidation procedure.

Determination of p-Cresol in Industrial Waste Waters. G. R. Tallon and R. D. Hepner. *Anal. Chem. 30,* 1521 (1958) Sept. (4 pp.)

Proposed method for determining *p*-cresol in phenolic waste waters employs two colorimetric reactions. Phenols are first complexed with 2,6-dibromoquinone chloroimide. The *p*-cresol does not react and is separated by steam distillation. It is then complexed with a diazo dye and the density measured at 495 mμ. Replicate tests indicate good precision.

Sulfur

Microdetermination of Sulfur and Halogens by Rapid Automatic Combustion. E. J. Agazzi, E. M. Fredericks and F. R. Brooks. *Anal. Chem. 30,* 1566 (1958) Sept. (3 pp.)

Microdetermination of sulfur and/or halogens in organic materials is devised using a single combustion type apparatus. Material is vaporized and carried through the combustion chamber in a stream of nitrogen. Oxidation products formed are absorbed and analyzed by conventional methods.

Viscosity

An Apparatus for the Viscometry of Organic Liquids at High Temperature. W. G. Burns and R. W. Wilkinson. *J. Sci. Instruments 35,* 291 (1958) Aug. (3 pp.)

An apparatus suitable for the measurement of viscosity of organic liquids at temperatures of up to 400°C is described. Sealed glass capillary viscometer is used so that oxygen can be excluded and measurements made above the normal boiling-point. Viscometer is immersed in a molten salt mixture contained in a welded tank and is viewed through special windows.

Water

Capacitance Measurement Is Valuable for Process Stream Analysis. F. E. Moore. *Oil Gas J. 56,* 96 (1958) Sept. 8 (4 pp.)

Tool is proving successful in many applications, particularly 1) octane improvement analysis made on catalytic reformers, 2) pipeline-interface detection, and 3) B.s. and w. monitoring of crude-oil streams.

X-Ray Methods

The Preparation of Powder Specimens from Active and Toxic Metals for Use in Conventional X-ray Diffraction Studies. *J. Sci. Instruments 35,* 301 (1958) Aug. (3 pp.)

Argon dry box and associated procedure are described for the preparation of specimens for use in Debye-Scherrer powder cameras at high and low temperatures. Special features allow filings to be annealed at >1200°C, and quenched, if necessary, in vacuo; there is no need for filings to be sealed in a container for this purpose. Filings can be sealed in silica quills for use as specimen, by a small electrical furnace.

Moisture Determination

Humidity Determination. D. R. Blumer (assigned to Minneapolis-Honeywell Regulator Co.) U.S. 2,848,-306 (1958) Aug. 19.

Water vapor is determined in a gaseous mixture by comparing thermal conductivity of a standard gas with that of unknown by converting all water therein to hydrogen by a metal hydride bed.

13. BASIC SCIENCE

Combustion

The Mechanism of Combustion of Pulverized Fuel. P. O. Rosin. *J. Inst. Fuel. 31,* 346 (1958) Aug. (10 pp.)

Description of the role of various partial processes which have to be combined to produce an efficient combustion mechanism and an attempt to correlate results of experience with those of research. It is established that in the investigation of the mechanism of combustion of pulverized fuel, the important element is the study of flame patterns as the statistical integration of all the partial processes discussed and the determination of their heat transferring properties.

Diffusion

On the Diffusion of a Chemically Reactive Species in a Laminar Boundary Layer Flow. P. L. Chambre and J. D. Young. *Phys. of Fluids 1,* 48 (1958) Jan.-Feb. (7 pp.)

Chemically reactive species is emitted from the surface of a body located in a hydrodynamic flow field. It diffuses into the fluid where it undergoes a simple isothermal homogeneous transformation. Analysis enables tracing of reaction history of this component in a laminar boundary layer flow which develops over the surface of a body.

Fluid Flow

Wall Effects in Shock Tube Flow. R. J. Emrich and D. B. Wheeler, Jr. *Phys. of Fluids 1,* 14 (1958) Jan.-Feb. (10 pp.)

Measurements were made of shock strength of average density across a shock tube and of pressure at the walls. These measurements are compared with explicit predictions. Under conditions where various theories should apply, they predict shock attenuation and values of the flow variables sufficiently well to justify as essentially correct the assumptions that the turbulent boundary layer produced by the shock is similar to the boundary layer observed in steady flows and that waves generated by wall effects can be considered as one-dimensional.

Fluidization

The Mechanics of Moving Vertical Fluidized Systems. Part 3. Application to Cocurrent Countergravity Flow. D. L. Struve, L. Lapidus and J. C. Elgin. *Can. J. Chem. Eng. 36,* 141 (1958) Aug. (13 pp.)

Cocurrent countergravity flow and batch fluidization of two ideal fluidized systems were studied experimentally in a 1-in. diam column. Systems were 0.0184-in. diam glass sphere-water and 0.00396-in. diam glass spheres-water. Holdup, pressure drop and fluid and particle velocities were measured for the cocurrent countergravity flow experiments. Holdup and fluid velocity were measured for the batch fluidization runs. Experimental data for cocurrent countergravity flow are in excellent agreement with the operating diagram for cocurrent countergravity flow determine from the holdup-slip velocity relationship obtained from the batch fluidization experiments.

Hydrocarbons

Hyperconjugation. Correlation and Calculation of Molar Volumes of Alkenes. C. W. Beck and L. Y. Beck. *Ind. Eng. Chem. 50,* 1301 (1958) Sept., Part 1 (2 pp.)

Taking hyperconjugation in weakly polar compounds as the main source of intermolecular attraction, an inversely proportional relationship with the molar volume is postulated. Using 134 monoalkenes, equations are derived to correlate hyperconjugation with molar volumes at 20° C. and 25° C. Similar equations hold of alkenes. Effect of molecular weight on the deviation from experimental values is discussed. These equations permit calculation of molar volumes of alkenes and alkynes at both temperatures with a mean deviation of less than 0.85 ml.

Kinetics

Kinetic Theory of Moderately Dense Gases. R. F. Snider and C. F. Curtiss. *Phys. of Fluids 1,* 122 (1958) Mar.-Apr. (17 pp.)

Kinetic theory developed is based on a modified Boltzmann equation which takes into account the "collisional transfer" of momentum and energy. Theory applies to pure gases made up of spherical molecules, and the effect of multiple collisions is neglected. Boltzmann equation is solved by a perturbation method which is applicable near equilibrium. Expressions for the flux coefficients, i.e., the thermal conductivity, bulk and shear viscosity are obtained from this solution and these are in turn evaluated for a rigid sphere potential.

Mass Transfer

Transfer Unit Simplifies Calculations. J. O. Osburn. *Chem. Eng. 65,* 147 (1958) Aug. 11 (4 pp.)

Unit is especially useful when there is direct contact between two fluid streams as in packed columns. Fundamental idea has wide application in gas absorption, extraction, distillation, adsorption, humidification and drying. Heat transfer and chemical reaction kinetics also have been treated in a similar manner.

Mathematical Methods

Unusual Graph Papers and Their Uses. G. A. Lessells. *Chem. Eng. 65,* 141 (1958) Aug. 11 (6 pp.)

Refresher describes some of the exotic graph papers —several of them strange to chemical engineers. Included are log—reciprocal-temperature, triangular, probability and reciprocal graph papers.

Oxygen

Oxygen Enrichment Increases Production, Decreases Costs. D. W. Pitts and J. L. Harrison. *Fuel Efficiency 6,* 27 (1958) Aug. (4 pp.)

Open hearth furnaces are used in the manufacture of 90% of British steel. Development of oxygen enrichment technique suggests modifications which can be applied to them to increase their productivity and decrease costs, so that they can successfully compete with the most up-to-date processes employed abroad. Article is based on a review of this situation.

Permeability

Effect of Adsorption in Barrier Separation. K. Kammermeyer and D. D. Wyrick. *Ind. Eng. Chem. 50,* 1309 (1958) Sept., Part 1 (2 pp.)

To establish that components of a gas or vapor mixture can be separated by permeation through a barrier on the basis of different absorption characteristics only, mixtures of propane and carbon dioxide were separated by a microporous barrier of porous glass. Flow of gas mixtures through barriers is affected by differences in adsorptive behavior. Barrier separation is normally considered to be due essentially to Knudsen flow. Almost all gases, and certainly all vapors, exhibit varying degrees of adsorptive or condensed flow with barriers. Such flow may enhance or adversely affect separation.

Temperature Measurement

Use of a Constant Current Hot Wire for the Measurement of Extreme Temperatures. S. A. Hoenig. *Rev. Sci. Instruments 29,* 704 (1958) Aug. (2 pp.)

Theory of constant-current hot wire circuit measurement of very high gas temperatures is developed and it is shown that such a system may be used above the melting point of the wire itself.

Viscosity

Approximate Formulas for the Viscosity and Thermal Conductivity of Gas Mixtures. R. S. Brokaw. *J. Chem. Physics 29,* 391 (1958) Aug. (7 pp.)

Approximate expressions for the viscosity and thermal conductivity of gas mixtures have been derived from the rigorous kinetic theory formulas. Three levels of approximation are distinguished, with the third approximation rigorous for binary mixtures.

Water

Reactions of the High Voltage Discharge Products of Water Vapor. P. J. Friel and K. A. Krieger. *J. Am. Chem. Soc. 80,* 4210 (1958) Aug. 26 (6 pp.)

Recombination of the high voltage discharge products of water vapor has been investigated on the surface of silica gel. Recombination reaction was accompanied by a temperature increase and a green luminescence on the gel surface. Principal reaction products were H_2 and O_2. Both the H atom and OH radical were removed as a result of the surface reaction but the silica gel surface did not catalyze the recombination of H atoms. It was concluded that the surface reaction is $S + OH = S\text{-}OH$, $S\text{-}OH + H = S\text{-}O + H_2$ $2S\text{-}0 = 2S + O_2$ where S is the surface. The water content of the gel controlled its activity in these recombination reactions.

Metals

Production of Metal Powders. L. Schlecht and E. Oestreicher (assigned to Badische Anilin- & Soda-Fabrik A. G.) U.S. 2,846,299 (1958) Aug. 5.

In a process for production of metal powders by thermal decomposition of metal carbonyls, improved product is obtained by cooling the reactor walls at points not used for supplying heat for decomposition.

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